

“On horseback through Hayti,” by Mr. George V. Nash,\* and was listened to with great interest by all present.

Adjournment was at 9:45.

TRACY E. HAZEN,  
*Secretary pro tem.*

## OF INTEREST TO TEACHERS

The sixth question suggested in the March number has enlisted many interesting letters. This issue contains but part of them; other letters referring to this and to the remaining questions will be printed later in *TORREYA*. The wide range in the letters is in itself suggestive.

The question here discussed is :

Why does not the study of botany more often create a lasting interest? Would this be secured by more emphasis on morphology, including classification?

Perhaps one reason more lasting interest is not secured is because there is so little that even the interested high school pupil can do by himself after completing his half year or whole year course in botany. Reading alone will not serve as in history, literature and foreign languages. The second part of the question was added with this difficulty in mind.

### I

The following is a qualified answer for I do not feel that I can answer the question for more than the students under my own observation.

For boys of the age when they come to the De Witt Clinton High School (13 to 15), I believe the more laboratory physiology or perhaps I should say the more simple experimental work and demonstration we give in elementary, physical, chemical, and biological science, the greater the interest. Things morphologic or taxonomic seem to gain and hold interest with but few; modifications and adaptations in structure interest more students; simple experiments with a definite problem put before the student

\* Instead of the usual abstract Mr. Nash has written a short article on the man-grove which appears upon another page; other interesting accounts of the same trip are to be published later in *TORREYA*.

to be worked out at home or in the laboratory almost never fail to gain interest and coöperation from our students.

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## II

One reason that the interest aroused by the average high school course in botany is not deeper and more lasting is that we try to cover too much ground and touch upon too many topics. If a young person is to follow a subject for his own pleasure he must feel to a certain extent that he has command of it. The mountain view is certainly broader and contains more that is interesting, but one feels no sense of possession and there is no starting point for activity.

One teacher when questioned looked up in surprise and said, "We teach only the fundamental principles as it is!" Where do "fundamental principles" end and can they all be taught in a course covering half a year to pupils who are strangers to science and who are only children? Botany itself is divided into half a dozen sciences; why not divide the "fundamental principles" similarly and try to teach only *one* branch. Any attempt at condensing a subject usually results in cutting out the most interesting part and leaving the dry bones.

It would seem that the question as to whether this narrower, more intensive course shall be mainly physiology, morphology, or classification, must depend upon the teacher, the pupils and the environment. As to classification, I would add that it is the department of botany which can most easily and most naturally be followed in an irregular way by a person with little preparation, a small outfit and odd minutes. But whether in any given school a course of that kind can be given with advantage, each must decide for himself.

STELLA G. STREETER.

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## III

To the first question I should be inclined to say that all our botanical courses and text-books intended for high schools are too technical, philosophically morphological and scholastic for high

school use. They are all written by technical botanists who have forgotten that they were ever young themselves. They are all much more "complete," difficult, and fatty-degenerated with unessential detail than their authors ever tackled in their own college courses. All this is apart from any vital human interest, and, naturally enough, the pupils, when they pass their examinations, lay it aside with a feeling of relief.

The old classification-key-analysis botany of two generations ago has died a natural death, as the little knots of grandmothers, who used to gather of summer afternoons to "analyze flowers" — the same ones over and over again — have been laid to rest ; and there is neither hope, nor occasion to resurrect it. If I add that I have never been able to discover anything in ecology which could serve any purpose in high school botany other than to make life a burden to the students, we may consider the fringes of the first question sufficiently treated. The main problem : Why not a more lasting interest ? would require more time than I, and more space than you, have to spare. But, in a single word, if we hope to awaken interests that shall live and grow with the mental life and growth of the pupil, we must select the matter which has the most vital human interest. In other words, it is absurd to expect everyone to become an enthusiastic technical botanist, but there are certain vital, fundamental, and universal interests in plants out of which technical botany has developed, in which all may reasonably have some share. Acquaintance with common wild flowers and common weeds, coupled with the idea of preserving species in danger of extinction or of exterminating undesirable species, appeals to me as one line of such common human interest. Knowledge of the esthetic possibilities of all sorts of wild and cultivated flowers, vines, shrubs, etc., is another line of perennial and wholesome interest. For this acquaintance work by all means let us have simpler keys, if possible, and let them include cultivated plants. Principles and possibilities of plant breeding is another line of interest well calculated to open up into wonderful botanical pastimes later on in life. Acquaintance work should extend to the algae and especially to the fungi — mushrooms, poisonous and edible, important parasitic forms of forest, orchard,

garden, and field, and the life histories of common household moulds and bacteria. Much of this should coördinate with hygiene, home, and community sanitation, and the great movement for national health ; and, if this is done, there will be no danger of interest flagging after once being kindled.

Local and national forestry problems, timber resources and water conservation and the knowledge of trees in relation to landscape improvement and roadside planting are other blocks of general human interest which the high school course in biology on the plant side should utilize to the full.

All the above suggests making high school botany strongly biological, and this seems to me to be the tendency both abroad and in this country. Physiological botany, excepting a very few fundamentals related to cultivation and plant breeding, I should think ought to await the college and university courses.

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#### IV

It is not easy to answer this question in a few words. There may be several different reasons why the subject of botany does not "more often create a lasting interest," some of which may apply with greater force to one school system than to another. It makes a difference, too, in which year of the high school the subject is taught. In what is said below, it is assumed that the course is given in either the first or second year of the high school.

It seems to me that one reason why botany does not arouse a more lasting interest in the pupils lies in the general lack of knowledge on the part of teachers of the nature of the pupils they are aiming to instruct. It is not that the teachers do not know their subject, but that they do not know their pupils. The high school teacher of science fresh from his college training has had no practice in the art of teaching, but this defect time will remedy. He has no adequate knowledge, usually, of psychology, especially child psychology, and without this he is unable to understand the adolescent in his true perspective, as related to the child that was, on the one hand, and to the man or woman

that is to be, on the other. Of course, a teacher soon learns to make many adjustments to the needs and capabilities of his pupils, and, indeed, is forced to do so, but in general the teacher's own college science course is only slightly modified to fit the high school pupil, and the result is a misfit. The high school needs the help of broadly-trained men and women to make its work serve better the needs of its pupils; not only is this true in the science work, but in other lines as well.

Looked at from this point of view the remedy for the lack of real and lasting interest in the botany work would certainly not be to add more morphology. That is quite the worst thing that we could do. Nor would it help to provide more artificial keys for the identification of plants, in the hope of stimulating interest through plant analysis. Neither should I advocate more ecology or more plant physiology, considering these merely as subdivisions of the science of botany.

The remedy lies, it seems to me, more in relating botany to the other life-sciences — zoölogy, including human physiology, particularly hygiene, thus making it a body of organized knowledge of the greatest value and interest to the adolescent. If given in the second year of the high school, it should follow a course in general science, given from an evolutionary and synthetic point of view. There are many problems in connection with such a course. Of these, I may mention three: first, how to bring the work in close touch with the life of the pupil and make it an influence for good, for example, in inculcating the love of out-of-doors, or in affecting personal and social sanitation; second, how to select for emphasis the evolutionary factors or elements which serve to bind the whole into a consistent body of knowledge, eliminating the useless details; and third, how to present this body of knowledge historically, as itself an organic growth now only in its infancy. Were these problems in teaching solved I believe there would be no question as to the practical value of botany, nor as to the interest aroused at high school age, nor as to the permanency of this interest in a relatively greater number of pupils than at present.

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## V

The ordinary student in our secondary schools usually receives but one half year instruction in botany. A large part of that half year is generally consumed in learning terms, an uninteresting task in any subject. By the time a working botanical vocabulary is obtained, little of the five months remains in which to find the real meaning of the subject. At the end of the half year, some other branch is substituted for this one and the little that is learned of botany is soon forgotten, while a continuation of the study for another half year might have led a number of students into more lasting sympathy with the subject. The teacher as well as the pupil finds the results of this short period unsatisfactory, and only the occasional student has obtained sufficient interest to lead to a pursuance of the study beyond the classroom.

The entrance to the high school opens up to the student at this formative period in his career a variety of attractive lines of study and possibilities for life work. The boy's leading is usually toward the "practical" studies, as mathematics and the physical sciences, the girl's toward literature and languages, and the assistance of these subjects in earning a livelihood has its effect upon the student's likes and dislikes, as well as upon his choice of subjects in the elective course.

The half year botany is frequently given in the first year when everything is comparatively new. In this crowded period of mental confusion and adjustment, when the student is adapting himself to new methods of study and instruction, its importance to him is lost. Even if given later in the course, it is seldom allowed the importance in the curriculum that other subjects, such as algebra, latin, geometry or literature, have. It is hence considered a minor subject, a study for "girls," as one high school boy expressed it. If required, the student in many cases takes the subject to "pass" it; if elective, because it "sounds easier" than some alternative.

To sum up: The study of botany does not more often create a lasting interest because of—

1. The unfortunately crowded period in the pupil's life when it is introduced.

2. The short amount of time devoted to it when the subject is given ; hence —

3. The superficial or technical manner in which the subject is taught.

4. The lack of immediate or close relation to the pupil's life, thought and needs at the time when it is introduced ; hence not sufficient interest is created for that interest to be lasting.

Although these conditions exist in many localities, in others they are being partially met by the introduction of plant study into the elementary schools. When the child, unaccustomed to some plant study earlier in his school life, begins his half year of botany in the high school, he must spend time in learning what to see and how to see it, as well as the application of the terms required. The child, accustomed to the observation of a plant in the elementary school, has already learned to see, at least in an elementary way ; he has learned a few necessary terms ; he has gained a foundation upon which to build his half year botany. He takes up the subject, now to be treated more technically, with an interest already created, and is ready to add to this foundation built in a natural way.

The introduction of the microscope before the student has learned to use his powers of observation with the unaided eye, the use of alcoholic and dried specimens with the beginner, and the study of plant parts without first considering the plant as a whole, all tend to deaden an interest that should continue beyond the botanical classroom. An intimate acquaintance with a few plants made in a proper manner and an introduction by name to as many plants as possible will place at the student's disposal a basis for continued interest.

For a few years past, I fear we have swung the pendulum too far from the value of the name of an object. The child, or ordinary grown person for that matter, wants a name for the thing at hand. He will recognize no other introduction. Further acquaintance may prove desirable, but he must first have the name. Therefore, I make a plea for means of simple classification leading to common names for common things. What's in a name? It may be the entire interest in a subject ; at least, the

lack of a name may cause a plant to go unnoted a long time, while the name alone may lead to further acquaintance never otherwise obtained.

Simple keys for tracing trees, flowers, etc., including the common cultivated plants, will take away one of the greatest drawbacks to finding the name of a plant, that is, the knowledge of difficult technical terms and the dependence of a determination upon some seasonable condition distinguished with difficulty.

Therefore, to create a more lasting interest in botany :

1. Introduce the subject earlier in the pupil's life.
2. Let the required amount of time given to introductory work be increased.
3. Have the basis for study comprehend a few types, including some closely related to student's life.
4. Learn by name as large a number of plants as possible.

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*Symons's Monthly Meteorological Magazine* for November, 1907, describes a unique hygroscope designed by John Aitken. The petal of one of the so-called everlasting flowers is attached to a stiff hair, which serves as a pointer, and the petal and hair together are fastened on a dial, set in a metal case. The instrument is about as sensitive as a hair hygroscope, but more compact and cheaper.

The Committee on the College Entrance Option, Professor W. F. Ganong and F. E. Lloyd, presented a report at the second annual meeting of the federated societies (the fourteenth of the Botanical Society of America), held in Hull Botanical Laboratory, at the University of Chicago, December 31, 1907. The committee recommended that a somewhat revised fourth edition of the high school course now used as a basis for the college entrance examinations in botany be printed, and that the committee confer with the American Society of Zoölogists in formulating a high school course in biology.

The "birds-eye maple" is discussed in *Science*, March 27, 1908. The solution of Dr. A. W. Borthwick, of Edinburgh, is



given, and another theory\* as to the origin of these peculiar markings is added to those already known. Dr. Borthwick thinks that this peculiarity is due to the formation of adventitious roots upon the stem, and that these arise from abnormal medullary rays. In none of the cases examined (with possibly one exception) were such roots due to mechanical injury, or the attacks of fungi or insects. While the conditions which govern the production of adventitious roots are not certainly determined, he is sure that moisture is an important factor, as it is "only in the moistest situation that they persist for any time after they pierce the periderm."

### NEWS ITEMS

Mr. Norman Taylor, who has been an aid in the New York Botanical Garden for several years, has been appointed custodian of the garden plantations.

Ira D. Cardiff (Ph.D., Columbia, 1906), professor of botany in the University of Utah, has been elected president of the recently organized Utah Academy of Sciences.

Mr. A. K. Chittenden has been appointed assistant in the U. S. Forest Service to investigate the White Mountains and the Appalachian Mountains in regard to the proposed national park.

\* *Ackerman's Repository*, an old English journal of "Arts, Literature and Fashions," published in 1825 an article on "Botanical Theory" which is interesting in this connection. The italics are ours. "This marking is an excellence not peculiar to any one tree, but is occasionally met with in the maple, citron, yew, ash, beech, lime and other trees. A knowledge of the particular time when trees may be expected to exhibit such figured appearances, seems to have been a secret confined to very few, who, by thus having the command of the market, contrived to keep up the prices. To the discovery of this secret, the fair botanist [Mrs. Ibbetson] has been led by her researches in support of a theory which she has the honor of *originating*: namely, that the buds of trees *ascend* from the *root*. Willdenow thought that they were formed in the bark; Mr. Knight says that they originated in the alburnum next the bark. 'Pliny's description of the *bruscum*, so prized by Romans in their tables,' says Mrs. Ibbetson, 'immediately brought to my mind the different figures of the roots of various trees, when cut down at the proper season, for this does not last above a fortnight or three weeks at most in any tree; but if taken within that time, most roots form a very beautiful picture.' This she contends may be attributed to the various grouping of the buds, as they are about to *start*, or have *started*, from the *root* on their progress up the different layers of the wood to the exterior."